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PROVISIONAL INTELLIGENCE REPORT

MOLOTOVSK SHIPYARD No. 402 IN MOLOTOVSK, ARCHANGEL OBLAST

CIA/RR PR-70
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PROVISIONAL INTELLIGENCE REPORT

MOLOTOVSK SHIPYARD No. 402 IN MOLOTOVSK, ARCHANGEL OBLAST

CIA/RR PR-70

(ORR Project 35.287)

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CIA/RR PR-70
(ORR Project 35.287)

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MOLOTOVSK SHIPYARD No. 402 IN MOLOTOVSK, ARCHANGEL OBLAST*

Summary and Conclusions

Molotovsk Shipyard No. 402 in Molotovsk, Archangel Oblast, is the most important shipyard on the north coast of the USSR. The design and arrangement of facilities indicate greater emphasis on construction than on repair. Naval vessels of all classes and types ranging in size from small coastal craft to battleships or large carriers and submarines can be built.

With existing facilities and one 8-hour shift, the shipyard is capable of annually producing 38,750 standard displacement tons (SDT)** of naval construction, which is equivalent to 1 cruiser, 4 destroyers, 6 oceangoing submarines, and 15 subchasers. The shipyard is also capable of producing annually 73,400 gross register tons (GRT)*** of merchant ships equivalent to 15 medium-size cargo vessels, if shipyard facilities were devoted to this type of production. These estimates are based on a normal construction program

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 1 June 1954.

** Standard displacement of a surface vessel is the displacement (in tons of 2,240 pounds) of the vessel, complete, fully manned, engined, and equipped ready for sea, including all armament and ammunition, equipment, outfit, provisions and fresh water for crew, miscellaneous stores, and implements of every description that are intended to be carried in war but without fuel or reserve boiler-feed water on board. Standard displacement of a submarine is the surface displacement and is similar to the standard displacement of a surface vessel but without lube oil, fresh water, or ballast water of any kind on board.

*** Gross register tonnage is a measure wherein the entire internal cubic capacity of the vessel is expressed in register tons (100 cubic feet to the ton). Certain spaces are not included in the measurement such as peak and other tanks of water ballast, open forecastle, bridge and poop, hatchway excess, certain light and air spaces, anchor gear, steering gear, wheelhouse, galley, cabins for passengers, and other minor spaces specified by law.

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utilizing all facilities rather than the maximum-size vessel on each building way. Production on this basis would seriously limit any simultaneous repair activities.

The yard was originally planned to produce naval vessels, and the principal production has been naval vessels, but no vessels larger than Skoryy-class destroyers have been completed.

Further development in this yard can be expected until it becomes capable of maintaining any northern fleet which the USSR is likely to establish with the possible exception of repair of underwater damage to large vessels. It is believed that repairs would be carried out in the graving docks in Rosta in preference to dismantling masts and structure above the 112-foot line as would have access to dock vessels in Molotovsk.*

The location of the shipyard is of strategic importance. It is one of the few large shipbuilding centers that has access to open sea through Soviet-controlled waters. Except in the most severe winters the approaches can be kept open to navigation. Very little foreign trade passes through the port, because nearby Archangel is the principal seaport for the area. Any construction within the large covered shipbuilding docks remains hidden until nearly ready for trials.

The shipyard is well developed and well coordinated, but is vulnerable with respect to its physical location. It is located about 1,000 miles from the principal industrial centers of the USSR. Transportation to the shipyard consists mainly of the Archangel-Vologda railroad line and to a small extent the Baltic-White Sea Canal, which is open to navigation only 6 months of the year. Heat and power are obtained from the single plant adjoining the shipyard. For a full production program, industrial labor would have to be recruited from the central and southern parts of western USSR because there are few heavy industries in the area of Molotovsk. The chief economic

* The height of the entrance to the large covered building docks is estimated at 124 feet. Assuming that the keel of a cruiser when afloat will be 10 feet above the dock floor and allowing a 2-foot clearance at the top, 112 feet may be occupied by vessel structure and uprights.

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hazard of the shipyard lies in the necessity of having an assured flow of raw materials and components produced by other industries.

I. Introduction.

This report on Molotovsk Shipyard No. 402 is one of a series of Soviet shipyard studies made in an effort to better assess the capabilities and importance of the Soviet shipbuilding industry.

II. Name and Location. 1/*

Molotovsk Shipyard No. 402, also known as Naval Dockyard No. 402, Molotovsk Naval Yard, Russia Naval Shipyard No. 402, or as Zavod No. 344 is situated north of the city of Molotovsk, Archangel Oblast, in Economic Region Ib.** The plane coordinates are latitude 64°34'52"N, longitude 39°49'59"E.

The shipyard lies on the southern shore of the Nikol'skoye Ust'ye, which empties into the Dvinskaya Guba, the southeastern arm of the White Sea.

The harbor and shipyard are entered through a dredged channel with a length of 5 nautical miles and a width of 180 feet. Because of rapid silting, constant dredging is required to maintain a depth of 27 to 30 feet.

Tides are semidiurnal. Mean high water springs rise 3 feet and mean high water neaps rise 2.5 feet.

The shipyard, including the area of the main electric power plant, extends in an east-west direction along the Nikol'skoye Ust'ye about 9,600 feet and extends inland about 3,000 feet. It covers an area of approximately 566 acres.

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* Footnote references in arabic numerals are to sources listed in Appendix C.

** The term region in this report refers to the economic regions defined and numbered on CIA Map 12048.1, 9-51 (First Revision, 7-52), USSR: Economic Regions.

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It is believed that weather conditions are similar to those in Archangel, where the mean annual temperature is 32.3° F, with an absolute maximum temperature of 94° F in July and an absolute minimum of minus 49° F in January.

The shipyard is about 19 miles west of Archangel. A single-track railroad of standard Soviet gage leads to Isakogorka, about 20 miles southeastward on the Archangel-Vologda rail line, where there are large classification yards. Another single-track rail line, probably standard Soviet gage, leads eastward through Rikasikha to Archangel. The dirt road leading east to the Archangel area is usable in winter only. A 2-lane plant road connects the commercial port with the city. Other roads are unimproved and in poor condition.

III. History and Organization.

1. History.

The shipyard, the harbor, and the town of Molotovsk date from the middle 1930's. The shipyard and the harbor have been built on land largely reclaimed from the Nikol'skoye Ust'ye. Nothing previously existed in the area except a few fishermen's huts and the old Nikolsky monastery.

Construction of the harbor and shipyard began in 1937, probably as a result of a decision in 1933 to build a large Soviet Northern Naval Fleet. It is believed that the plans were to develop a shipyard for the construction of new vessels to support such a fleet. In view of the secret prewar collaboration with Germany, it is probable that the advice and technical assistance of German engineers who had experience in building the shipyards at Wilhelmshaven were placed at the disposal of the USSR for the building of the Molotovsk Shipyard.

Following the war the shipyard at Wilhelmshaven was dismantled and its machinery transported to the far north in Soviet ships. There seems to be little doubt that the destination of part of this equipment was Molotovsk. 2/

Work on the shipyard continued until 1941, when it was halted by the war. During the war the town suffered some damage, but the damage to the shipyard was slight. Building resumed in the

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shipyard in 1947. 3/ Fig. 1 and Fig. 2* show the layout of the shipyard and the arrangement of facilities. The transverse building ways shown as points 21 and 39 on the chart of the shipyard were completed and in use before and during the war. The large covered building docks and launching basin shown as points 28, 29, and 35 were not complete and operational until 1949.

Labor camps of many political prisoners were set up nearby to supply the labor force. Following the war a few prisoners of war also were employed. It was reported that from 15,000 to 20,000 forced workers were employed in the expansion of harbor and shipyard installations after the war. 4/

Construction of new buildings and facilities may be under way. It is believed that development will continue until the shipyard is capable of maintaining any northern fleet the USSR is likely to establish.

2. Organization.

Before March 1953 Molotovsk Shipyard No. 402 was reported under the Ministry of the Shipbuilding Industry (Ministerstvo sudostroitel'noy promyshlennosti -- MSP) and subordinate to the main administration in charge of plants producing submarines and large warships. 5/ During the government reorganization of March 1953 this ministry was combined with the Ministries of Transport Machine Building, Heavy Machine Building, and Construction and Road Machine Building to form a single Ministry of Transport and Heavy Machine Building. The combined ministries were returned to their former status as individual ministries following the reorganization of April 1954. It is assumed that the Molotovsk Shipyard No. 402 is again under the Ministry of the Shipbuilding Industry and subordinate to the main administration in charge of plants producing submarines and large warships.

IV. Importance.

Molotovsk Shipyard No. 402 is the largest and most important shipbuilding center on the north coast of the USSR. It was originally designed for the production of naval vessels and for work beyond the capacity of Rosta Shipyard in the Kol'skiy Zaliv (Kola Inlet). Except in unusual winters, approaches to the yard can be kept open to navigation. 6/

* Fig. 1 and Fig. 2 follow p. 6.

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The Soviet Navy, required by geographic restrictions to maintain a separate fleet for each coastal region, has developed separate basing, shipbuilding, and repairing facilities for each fleet. Construction and repair for the North Sea Fleet is handled, within its limitations, by Molotovsk Shipyard No. 402.

The covered and heated shipbuilding docks permit uninterrupted construction of large naval vessels of cruiser, battleship, or medium carrier size. These docks are the largest facility of their kind in the USSR, 7/ and in terms of ability to handle large-sized ships and of equipment and facilities, the docks are probably the best in the USSR.

On the basis of one report indicating that prefabricated parts and copper castings have been furnished to the Krasnaya Kuznitsa Yard in Solombala, 8/ it is assumed that Molotovsk may furnish other shipyards in the area and elsewhere in the USSR with products of its shops.

This yard is one of the few large shipyards that has access to open sea through Soviet-controlled waters. The shipyard is exceptionally well screened from observation by commercial vessels trading in Molotovsk. Very little commercial shipping passes through the port, which is about 1 mile from the shipyard. Also, any construction under way in the covered ways remains hidden until it is nearly ready for trials.

V. Buildings and Facilities.

The charts of the shipyard, developed from enlarged aerial photography 9/ but revised to agree with various intelligence reports, are believed to present a reasonably accurate picture. Some of the buildings plotted from aerial photography remain unidentified. A key to the buildings and facilities that have been identified will be found on the chart.

Construction of the shipyard began in 1937. For the most part the buildings are of permanent construction with masonry walls, metal and composition roofs, steel-supported roof structures, and overhead crane supports. 10/

Very little data on installed equipment and facilities are available, because most sources were generally prohibited from entering completed shops or engaging in production. Several good reports,

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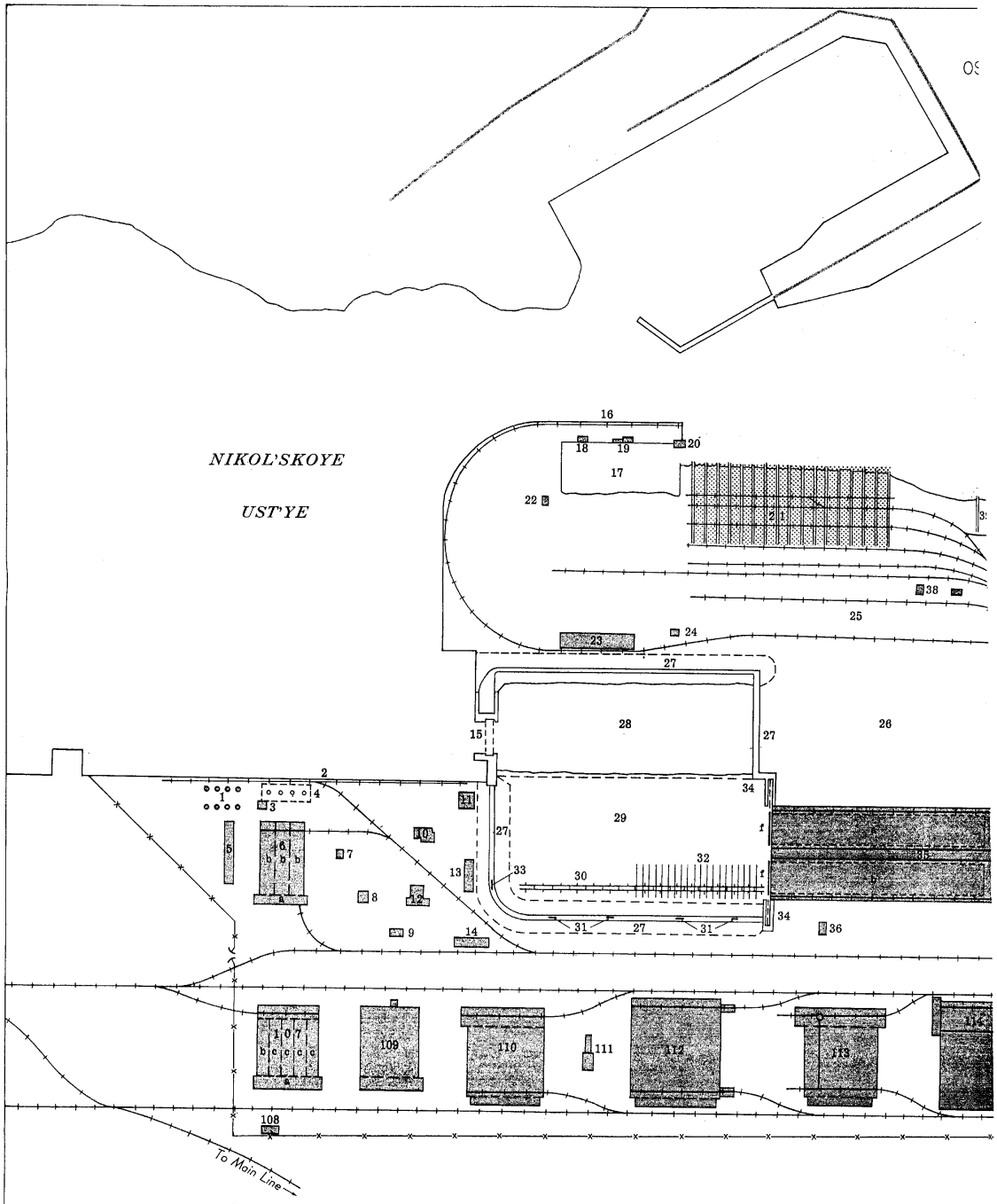

1. Gasoline storage tanks
2. Outfitting quay
3. Pumping station for subterranean oil depot
4. Subterranean oil depot
5. Pipe storage
6. Pipe shop
   a. Small shops and tool rooms
      Offices on second floor
   b. Shop area
7. Transformer house
8. Guard house
9. Steam relay station
10. Unknown
11. Pumping station for launching basin
12. Unknown
13. Winch house for launching vessels from 35b.
14. Transformer house
15. Launching basin gate (watertight)
16. Outfitting quay
17. Small basin
18. Tool shed (probable)
19. Tool shed (probable)
20. Tool shed (probable)
21. Transverse building ways
22. Unknown
23. Warehouse
24. Unknown
25. Open storage
26. Open area (swampy)
27. Launching basin walls
    (Top 33 feet above Basin 29)
28. Launching basin, north
    (Water depth 33 feet)
29. Launching basin, south
    (Floor 7 feet above H.W.S.T.)
30. Tracks for launching cradle
31. Bollards
32. Bearers (wood surfaced, 20 inches high)
33. Fairlead drums for launching cables
34. Slot for building dock gates
35. Covered shipbuilding docks
    a. Building dock, north, 150 ft. x 1000 ft.
    b. Building dock, south, 150 ft. x 1000 ft.
    c. Sub-assembly areas
    d. and e. Shops (first floor)
       Offices (upper floors)
    f. Watertight gates
36. Unknown
37. Unknown
38. Unknown
39. Transverse building ways
40. Workshop
41. Unknown
42. Unknown
43. Wharf
44. Causeway
45. Shed
46. Shed
47. Shed
48. Unknown
49. Office building
50. Unknown
51. Cement plant (crushing)
52. Unknown
53. Unknown
54. Transformer station
55. Unknown
56. Unknown
57. Unknown
58. Unknown
59. Unknown
60. Steam plant
61. Telephone exchange
62. First aid station
63. Transformer station
64. Unknown
65. Cement works
66. Moulding or pattern shop
67. Moulding or pattern shop
68. Moulding or pattern shop
69. Moulding or pattern shop
70. Unknown
71. Unknown
72. Unknown
73. Pipe and small vessel repair shop
74. Unknown
75. Fabrication and sub-assembly shop
    (Probably includes mold loft)
76. Unknown
77. Unknown
78. Unknown
79. Unknown
80. Unknown
81. Unknown
82. Unknown
83. Unknown
84. Unknown
85. Unknown
86. Unknown

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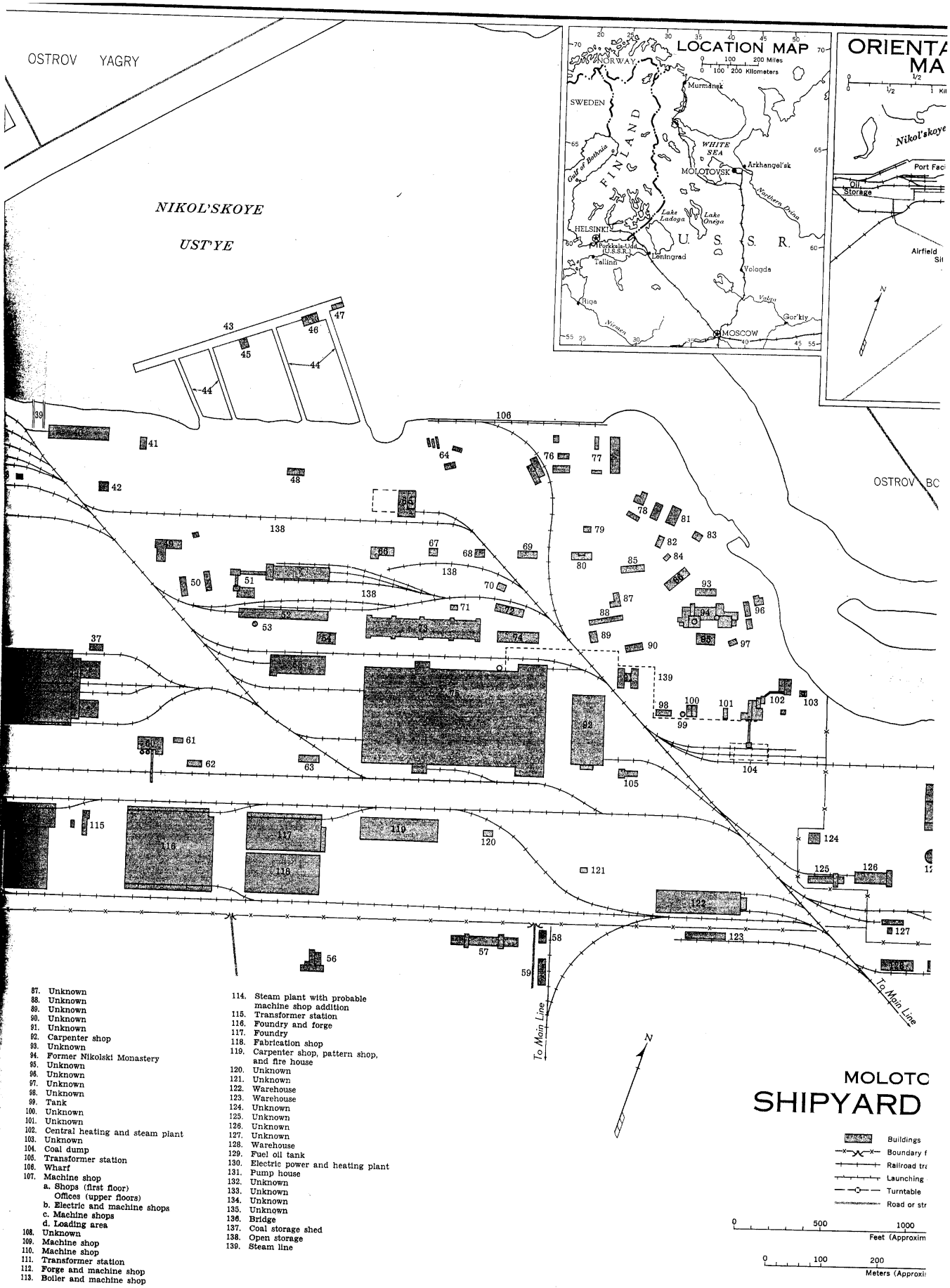

87. Unknown
88. Unknown
89. Unknown
90. Unknown
91. Unknown
92. Carpenter shop
93. Unknown
94. Former Nikolski Monastery
95. Unknown
96. Unknown
97. Unknown
98. Unknown
99. Tank
100. Unknown
101. Unknown
102. Central heating and steam plant
103. Unknown
104. Coal dump
105. Transformer station
106. Wharf
107. Machine shop
a. Shops (first floor)
Offices (upper floors)
b. Electric and machine shops
c. Machine shops
d. Loading area
108. Unknown
109. Machine shop
110. Machine shop
111. Transformer station
112. Forge and machine shop
113. Boiler and machine shop
114. Steam plant with probable machine shop addition
115. Transformer station
116. Foundry and forge
117. Foundry
118. Fabrication shop
119. Carpenter shop, pattern shop, and fire house
120. Unknown
121. Unknown
122. Warehouse
123. Warehouse
124. Unknown
125. Unknown
126. Unknown
127. Unknown
128. Warehouse
129. Fuel oil tank
130. Electric power and heating plant
131. Pump house
132. Unknown
133. Unknown
134. Unknown
135. Unknown
136. Bridge
137. Coal storage shed
138. Open storage
139. Steam line

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Figure 1

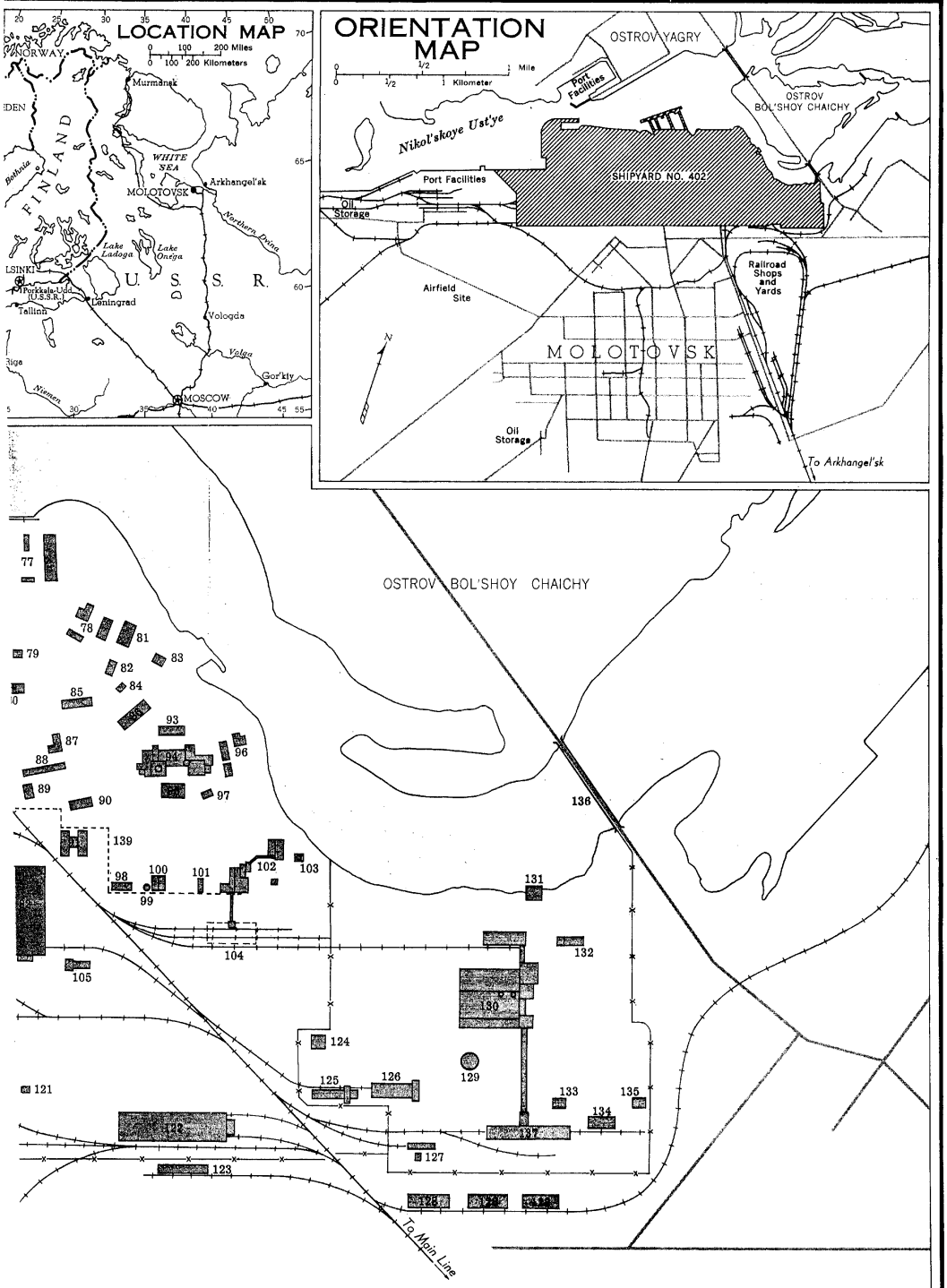

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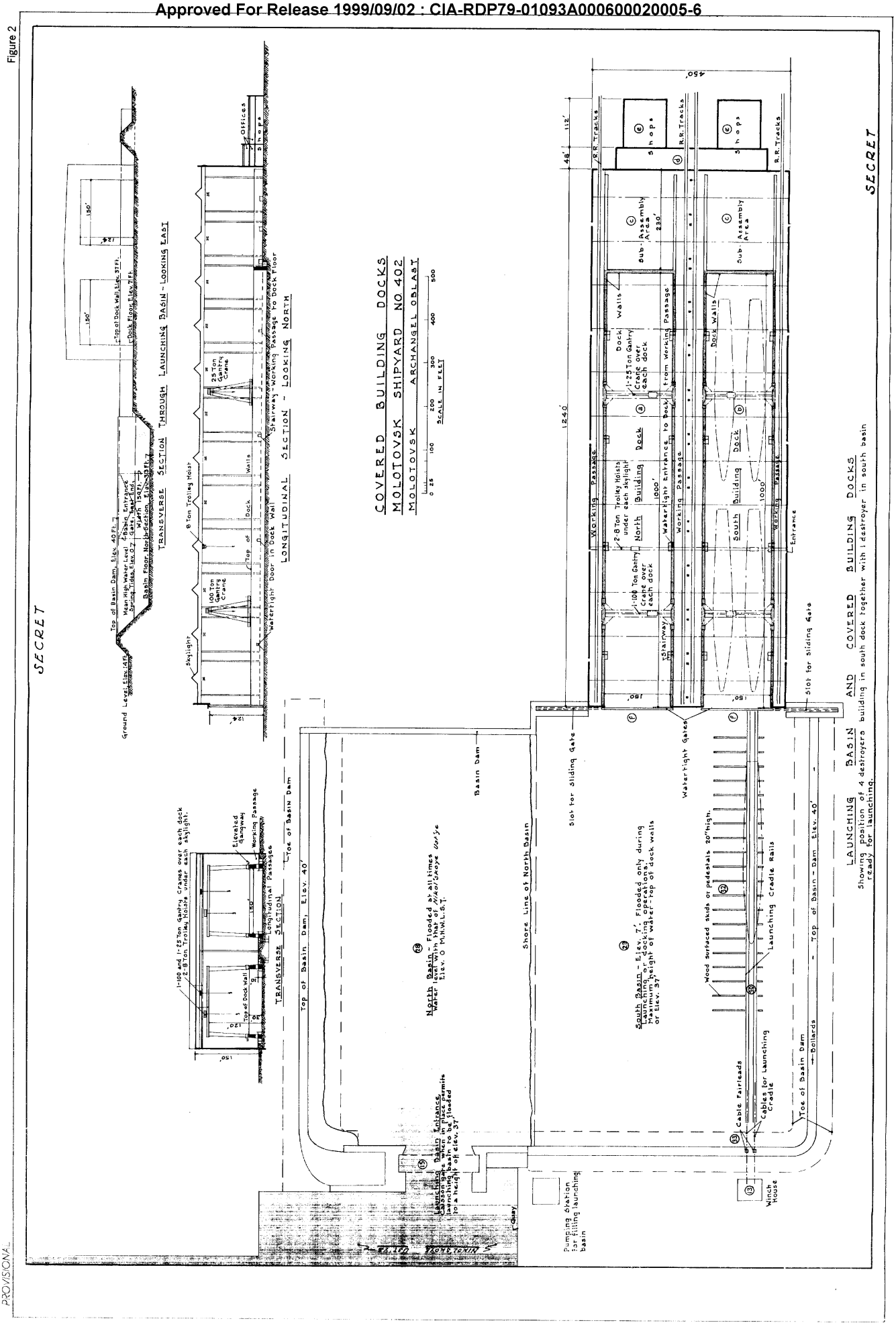
Figure 2



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however, were obtained from sources who because of their specialized training were directed to make repairs or to aid in installing equipment. It was mainly from the latter sources that building use was determined.

Intrayard transportation is chiefly by railroad. As can be seen on the chart of the shipyard, the shops, shipbuilding ways, docks, and outfitting quays are well served by railroads. Trackage is generally standard Soviet gage so that freight cars may be shunted directly into shops, shipbuilding ways, and outfitting quays without transshipment of freight. The shipyard is protected on the land side by a fence. Reports as to the type of construction vary from masonry to wood topped with an electrified wire. All entrances are guarded by armed guards and entrance is by pass only. 11/

Descriptions of the shipyard's building, equipment, and facilities were obtained from many reports. The equipment is listed as reported even though it may be considered inadequate to perform the operations indicated by the designated use of the buildings. Although the majority of sources had very little knowledge of the installed equipment, it is believed that the designated use of the buildings is fairly accurate.

1.* Gasoline Storage Tanks.

The gasoline storage tanks are about 20 feet in diameter by 26 feet high. 12/

3. Pumping Station for Subterranean Oil Depot.

The pumping station for the subterranean oil depot is a single-story building equipped with diesel pumps.

4. Subterranean Oil Depot.

The subterranean oil depot is an underground tank approximately 196 feet long by 26 feet deep (width not given). It is used for the storage of oil. As the source mentioned a steam line in

* The identifying numbers for this section correspond to those found on Fig. 1. Certain numbers have been omitted because nothing is known about the buildings they identify other than their probable use.

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connection with the pipes attached to the oil depot, it is probable that the stored oil is fuel oil of the viscosity of bunker-c.

6. Pipe Shop.

The pipe shop contains a copper smithy, valve-testing equipment, pipe-bending equipment with sand-filling installation for pipes, an electric-welding department, a plumber's shop, several small forges, lathes, two overhead trolley hoists in each b bay, and pipe racks. In bay a there are administrative offices, the foreman's office, tool issue rooms, material issue rooms, an electric shop, which occupies parts of three floors, and the mess hall. The plant is equipped with steam, compressed air, and water service. The shop produces valves and pipes, and it has been reported that crew lockers were manufactured and that some joiner work was done here. 13/

11. Pumping Station for Launching Basin.

The pumping station for the launching basin is a 2-story building containing six 200-horsepower (hp) electrically-driven pumps, which are reported to be capable of filling the basin to its maximum capacity in 18 hours. 14/

15. Launching Basin Gate.

The clear width of the entrance to the launching basin is estimated at 150 feet. A single-piece floating caisson is warped into position to form a watertight lock so that the basin may be flooded to a height necessary to launch or dock vessels in the covered building docks. The caisson is approximately 70 feet high and 12 feet wide at the top. In each of the basin wall ends, which form the piers to receive the caisson, are located 3 rows of 2 openings each in the west face of each pier and the same number within the entrance, facing north and south, respectively, but located west of the caisson. These openings are about 6 feet by 8 feet by an unknown depth. Electric motors of 100 horsepower were installed in some of the openings. 15/ It is believed that some of these openings are for the purpose of draining the flooded basins and that others house the motors that operate the flood gates and possibly the warping winches which position the floating caisson.

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21. Transverse Building Ways.

The approximate length of the transverse building ways is 925 feet. The inland depth is difficult to determine. It was reported that 10 ways, each 820 feet long, were planned, of which only 7 were completed by 1944. 16/ Apparently these ways were planned for the serial construction of destroyers and smaller craft. The 1944 aerial photographs show that 3 parallel building areas exist, which would give an effective building width of 55 feet between the rail tracks and the water and 70 feet between rail tracks for each of the 2 inland areas. The rail tracks crossing the building ways could also serve mobile cranes. Vessels constructed on these ways are side-launched directly into the water.

Before the completion of the large covered building docks and the large launching basin in 1949, these ways, together with the one at point 39, were the only areas in which ships were constructed. It is not known whether they still exist, but it seems reasonable to believe that small craft still may be built or submarine sections assembled during the summer months. No heavy lifting facilities have been observed in this area. Two 2-arm mobile cranes of unknown capacity were observed in 1949, which are believed to have been used also in conjunction with the outfitting quay, point 16. 17/

26. Open Area.

The open area at point 26 was reported to be swampy and overgrown with reeds. 18/ There was no indication of yard expansion in this area, although the building of graving docks or of additional covered building docks north of the existing covered area is considered logical.

27. Large Basin Walls.

For the most part the walls of the large basin are an earthen dam sloping on both sides and surfaced on top for a width of 20 feet with precast concrete slabs. The outside slope of the dam is seeded, probably to prevent erosion, and the inside slopes are faced with rock. The top of the dam is estimated to be about 33 feet above the level of the southern floor of the basin, point 29. Reports conflict as to the existence of a gate in the eastern wall, opposite the main basin entrance. The construction of this eastern wall is somewhat different. It is reported to have been made up of a

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network of wooden beams, but the existence of a gate is doubtful. The part of the wall forming the main entrance piers, point 15, and the slots into which slide the gates of the covered building docks are of concrete. The earthen dam was begun before World War II and completed in 1948. 19/

28. Launching Basin, North.

The final excavation of the north launching basin was made in the summer of 1948 although the sand bar lying to the west and in way of the basin entrance was not removed until the summer of 1949. The basin was excavated to a depth of about 33 feet below the water level of the Nikol'skoye Ust'ye. The floor of this basin was covered with gravel 12 inches thick. 20/ This basin is normally flooded level with the Nikol'skoye Ust'ye except during launching or docking operations, during which the water level is raised to the required height.

29. Launching Basin, South.

The floor of the south launching basin is about 7 feet below the shipyard ground level and about 7 feet above the water level in the north basin. The floor of this basin is sloped slightly toward the north basin. In front of the building docks, however, it is practically level with the dock floor. This basin is dry at all times except when the basin is flooded for launching or docking vessels.

From a point near the entrance to the southern half of the south building dock and running westward for the full length of the basin floor are 2 sets of steel rails set in concrete about 12 feet apart flush with the basin floor. These rails carry the launching cradles on which vessels differing in size but including destroyers are moved from inside the south dock into the launching basin. (See point 30.) The remainder of the basin floor is covered with gravel. 21/

North and south of the cradle tracks and at right angles to them are installed concrete skids or bearers surfaced with 12-inch-thick timbers. The height of the bearers above the basin floor is about 20 inches. On the south side the bearers are about 13 feet long, and those on the north are about 78 feet long. Their use is not known, but it is thought that they may be used for temporary docking and possibly for multiple launchings by skidding newly built vessels onto the bearers before flooding the basin. (See point 32.)

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The layout of the 2 basins, points 28 and 29, would indicate that a wider use of the south basin was contemplated than the floating of vessels into and out of the building docks. It is considered feasible that this basin may be developed to dock vessels for underwater inspection and repair of hull, propellers, and tailshafts and, with the installation of lifting facilities, to effect repairs.

30. Tracks for Launching Cradle.

See the description under 29, above.

31. Bollards.

Secured to the top of the basin wall are a number of bollards.

32. Bearers.

See the description under 29, above.

35. Covered Shipbuilding Docks.*

The covered shipbuilding docks are the largest facility of this kind in the USSR. The main building is about 1,240 feet long by 450 feet wide with an over-all height excluding skylights of 150 feet. The building is heated so that work can proceed during the winter months uninterrupted by extreme weather conditions. At the eastern end there are two annexes, d and e, which probably contain light machine and assembly shops on the first floor and administrative and engineering offices on the upper floors.

The main building is divided into 3 main divisions, the 2 shipbuilding docks a and b, and the subassembly area c. Each of the shipbuilding docks is surrounded on 3 sides by a concrete wall approximately 30 feet high. The fourth side or entrance can be closed by a watertight gate. Each dock is watertight and can be flooded to the top of the wall. Both docks can be flooded simultaneously or singly as required. Section c is a subassembly area approximately 230 feet wide. Four railroad tracks run the full length of the building, 2 between the docks and the outside walls of the building and 2 through the center passage between the docks. Crane rails are

* See Fig. 2 following p. 6.

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installed on top of the dock walls and continue over similar support for the length of the subassembly area ahead of the building docks. Each building dock and assembly area is served by 2 gantry cranes, 1 of 100-ton capacity and 1 of 25-ton capacity. Twelve trolley hoist tracks run the width of the building, one under each skylight. Each track is mounted by two 8-ton trolley hoists.

The entrance to each dock, point f, is 150 feet wide by 124 feet high. The entrance doors are probably sectional in construction. The lower section is in 1 piece 30 feet high by 150 feet long and designed, when closed, to form a watertight end of the dock. This lower section, when opened, slides on three rails into concrete slots in the basin dam. The upper section of each door is about 94 feet high by 150 feet wide and is suspended from overhead tracks.

Entrance into the building docks from the passages and subassembly area is by means of watertight openings, eight in each dock.

The launching and docking of vessels is a somewhat unusual procedure although it is similar to the procedure of the Komsomol'sk Shipyard on the Amur River. There are two procedures used in launching. The first is used when one or more vessels are constructed in one dock and all are ready for launching. Then the basin gate, point 15, is closed, and basins 28 and 29 and the shipbuilding dock are flooded to a height sufficient to float the vessel or vessels. Each vessel is then moved from the shipbuilding dock to basin 28 where it remains until the water level is lowered equal to that of the outside channel. The basin gate, point 15, is then removed, and the launching procedure is completed. The second launching procedure is used when 2 or more vessels are building in 1 dock and are in various stages of completion. The construction schedule is set up so that the vessel occupying the southwest corner of the dock is the most advanced. When this vessel is ready for launching, it is moved from its position in the building dock to basin 29 by means of a launching cradle mounted on the steel rails, point 30. The cradles are towed by cables which run over the drums, mounted on top of the basin wall, point 33, to the winch house, point 13. The gate of the building dock then is closed and made watertight, and basins 28 and 29 are flooded to a height sufficient to float the vessel. The vessel then is moved out of the basins as described before.

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39. Transverse Building Ways.

The "Artillerist" class subchasers, which are about 160 feet long, were built on the transverse building ways during World War II. One report indicates that the caisson gate for the large launching basin, No. 15 on layout, was constructed at this point. 22/

40. Workshop.

The two-story building at point 40 on the chart is probably a workshop or an assembly shop for vessels under construction on transverse ways, point 39.

43. Wharf.

The wharf may possibly be used for the loading and unloading of stores and cargo, where they are handled by the ship's own facilities. No wharf-stationed lifting facilities have been reported.

75. Fabrication and Subassembly Shop.

The fabrication and subassembly shop is the principal hull steel fabrication shop in the shipyard. Small subassemblies are made here and transported by rail to the shipbuilding docks and ways. 23/ Radio and radar equipment shops also are located in this building. It is believed that a mold loft may be located on an upper floor.

107. Machine Shop.

Section a of this shop probably contains small shops and tool rooms on the first floor and administrative offices on the second and third floors. Section b contains an electric repair shop, the chief mechanic's office, milling machinery, steam hammers, and a forge. Section c contains several lathes for machining propeller shafts up to 40 feet long, drill presses, a number of smaller lathes, and a ship fitters shop. Section d is a loading and unloading area. One or 2 small 7- to 15-ton capacity overhead traveling hoists serve each of the b and c sections. 24/

109. Machine Shop.

The southern transverse section houses the mechanics' electricians' and carpenters' shops on the first floor, the mess hall on the second floor, and the administrative offices on the third floor.

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The main shop houses milling machines, drill presses, and a number of small lathes. The main shop is divided into 5 sections, each of which is served by one or two 7- to 15-ton capacity overhead traveling cranes. 25/

110. Machine Shop.

The machine shop given at point 110 is probably also used as a dressing shop for castings. One report states that anchors and propellers are finished here. 26/

112. Forge and Machine Shop.

The south end of the building listed as point 112 is two stories high and houses administrative offices. The main shop is a forge and machine shop containing a number of lathes and boring machines, most of which are new and of German manufacture. Large BITIER lathes installed in this shop are reported to be capable of machining naval gun barrels. This shop is reported to be capable of producing naval guns of small caliber up to 7.1 inches. It is also reported that flanges, turbines, and electric generators are produced here. 27/ It is believed that turbines and generators may be assembled rather than manufactured here.

113. Boiler and Machine Shop.

The boiler and machine shop was built after the war. The southern end contains administrative offices. The western half of the main shop is an assembly area with a wood-surfaced concrete floor. The eastern half has about 30 heavy machinery installations. The north end is a loading and unloading area. The main shop and loading areas are served by overhead traveling cranes of 45-ton capacity in the loading area and 17-ton and smaller capacity in the main shop. The shop is reportedly being built to manufacture boilers. 28/

114. Steam Plant with Probable Machine Shop Addition.

The northern part of the steam plant houses the steam-generating and compressed-air machinery. The southern part is believed to have been constructed since the war.

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116. Foundry and Forge.

This building at point 116 contains two coke-fired melting furnaces. It also contains reheating furnaces and steam presses which forge propeller shafts. 29/

117. Foundry.

The foundry was probably completed in 1951.

118. Fabrication Shop.

The shop at point 118 was reported to be a rolling mill. 30/ It is possible that steel plates and shapes are rolled here, but it is believed unlikely because of the great distance from steel ingot production. The source may refer to plate-straightening or bending rolls, in which case the shop may have reheating furnaces. The shop is probably a hull-fabrication shop.

130. Electric Power and Heating Plant.

The capacity of the electric power and heating plant is reported to be 50,000 kilowatts. 31/ Although this plant appears to be separate from the shipyard proper, it has been included among the facilities because it is the chief source of electric power and possibly of steam heat for the shipyard.

Cranes.

Very little information has been received relative to lifting facilities for the outfitting piers, points 16 and 2, for the transverse building ways, point 21, and for general use throughout the shipyard. A 10-ton floating crane and two 2-armed cranes, however, were observed near point 16. It has been reported that two floating cranes are stationed at the commerical port. One is a self-propelled crane of 150-ton capacity and the other of 50-ton capacity is mounted on a dumb barge. 32/ These floating cranes could very well serve the shipyard also because it is doubtful that commercial trade through the port requires the full-time use of the cranes.

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VI. Production.

There are no data available that can adequately reflect the capability of the shipyard or the associated shops during the period 1949-54 to produce either naval or merchant vessels. The construction of this new shipyard began in 1937 and with the exception of the war years, during which all construction practically ceased, has been in a progressive state of development.

A. Ships.

Until the summer of 1949 the only building ways from which ships could be launched were the transverse ways shown at points 21 and 39 on the shipyard chart. On these ways no ship larger than the O-class destroyer was built. Although no confirmation is available of the number of ships, the following types of vessels were reported to have been built on these ways: destroyers (probably O class), subchasers (probably Artillerist class), submarines (probably SHCH and M classes), and medium and small war and merchant vessels. In 1949 it was reported that a series of "escort vessels", 50 to 65 feet long by 16- to 20-foot beam each having 2 propellers were being constructed in the shipbuilding dock. The construction time of these vessels was reported as 3 months each with a reported planned program of 16 per year. 33/ It is believed that the reference is to the transverse building ways rather than to the large covered shipbuilding docks, shown as point 35, because the report refers to the large shipbuilding docks as the "concrete drydock."

In the summer of 1949 the launching basin to the large covered shipbuilding dock was completed and made operational. This development enabled the shipyard to extend its capacity to the building and launching of vessels of battleship or carrier size. Before the completion of the basin no vessel could be launched from the large building docks. Several reports state, however, that 2 battleships were laid down in these docks, 1 in 1940 and 1 in 1941. Other reports state that only 1 battleship of 45,000 to 50,000 SDT was under construction and that it was building in the south dock. It is believed that the latter reports are probably true, because the 25- and 100-ton gantry cranes had not been installed in the north dock until 1949. After the war the USSR apparently abandoned the battleship program, and the hull in the south dock was completely dismantled by the early part of 1948. Following the dismantling of the battleship, the keels of 4 destroyers were laid down in the south dock.

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These 4 destroyers, of which the first 3 were reportedly named Ogneny, Okhotlivvy, and Stalin, were launched during the last half of 1949. Following the launching of these 4 destroyers, new keels were immediately laid down, and by December 1949 the new hulls were taking shape. Eight destroyers of the Skoryy class were sighted in July 1951 near the Kola Inlet, 4 of which had become operational only a few months before. It is believed that the second group of four destroyers was completed and had become operational by July 1951 with the Northern Fleet. 34/ It is estimated that a group of 4 destroyers of the Skoryy class could be produced and made operational with the fleet from 1 dock every 18 months.

Up to the date of this report, with the exception of the dismantled battleship, no construction larger than the Skoryy-class destroyer has been reported under construction at any place in the shipyard.

Vessels of destroyer size and smaller built in the covered shipbuilding docks can be essentially completed before launching. Because of the great height of the entrance to the docks, such items as the stacks, superstructure, and masts can be erected before launching. It is believed that complete fitting out, including all naval ordnance, is accomplished within the dock. Immediately following the floating of the second destroyer in the south basin, smoke was observed coming from the stacks, indicating that steam was being generated, and the conclusion may be drawn that only dock and sea trials remained to be accomplished. 35/

B. Repair of Ships.

There is little indication of extensive ship repair activities. During the years 1946 to 1949 a vessel of cruiser size was undergoing an undetermined amount of conversion at the fitting-out quay, point 16 on Fig. 1. The destroyer Gremyashchiy, probably a Gnevnyy-class destroyer, reported burned out during the war, was also rebuilt in the shipyard. This destroyer was moved into the north dock of the large covered shipbuilding docks in October 1949. 36/

No heavy lifting facilities were observed at any of the quays to indicate that major repair or fitting out could take place in the open.

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The only facilities which can adequately accomplish major hull and machinery repair or overhaul are the large covered docks. Large vessels can be docked in the covered docks only after all top masts and structure above the 112-foot line have been dismantled.

C. Shops.

The shipyard is well equipped with machine shops, fabrication and assembly shops, foundries, and forges which produce heavy and light castings, anchors, propellers and propeller shafts, and piping valves. All hull fabrication, including submarine hull fabrication, is believed to be accomplished in the shipyard. 37/ The shipyard has fine machine shops, and progressive development indicates that the yard will assume a greater portion of the manufacture of the end products than previously possible. Therefore, past production records are of relatively little importance in assessing the over-all value of the shipyard.

VII. Labor.

Reports up to late 1949 as to the number of shipyard employees range from 5,000 to 14,000 employees. 38/ During this period the shipyard was engaged in producing ships, erecting shops, installing machinery, and building the large launching basin.

The employees in the immediate postwar years were mainly forced laborers, many of whom were women, and a few prisoners of war. A small number of Soviet free civilians were employed as engineers in charge of shipbuilding. 39/

Three shifts, composed of 1,200 employees each, were used in the large, covered shipbuilding docks in 1949, when 4 destroyers were under construction in the south dock and no work was under way in the north dock. Each shift included 150 naval personnel, most of whom were skilled workers, 16 apprentices, 30 free civilians who were in charge of shipbuilding, and 1,000 forced laborers. Work in most of the production shops and covered building docks during the years 1946 through 1949 was reported being carried on in 3 shifts. 40/

A theoretical but realistic program for the construction of naval vessels in the shipyard (see Table 4) indicates that 38,750 tons can be completed annually. This production would require a labor force of 13,000* direct employees on a 1-shift basis. Assuming that this

* Direct employees are personnel whose labor is directly chargeable to a specific ship.

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direct force is 75 percent of the total employment, the total shipyard force required would be 17,400.

In calculating the number of direct employees the figures in Table 1 showing the number of man-hours required in the US to construct certain types of naval vessels were used. 41/

Table 1

Man-Hours Required to Construct Naval Vessels in the US

Type of Vessel	Tonnage (SDT)	Total Man-Hours per Vessel	Man-Hours per SDT
Subchaser	240	200,000	833
Cruiser	14,000	7,465,000	533
Destroyer	2,600	2,160,000	830
Submarine	1,480	1,400,000	945
Submarine	587	600,000	1,022

The productivity of the free Soviet shipyard worker is assumed as comparable to that of the US worker. No factor of relative efficiency was therefore used. The continued use of forced labor in Soviet production shops and shipbuilding facilities would, however, make doubtful the estimated production rates and the adequacy of the estimated total number of employees.

The working year (man-year) in the USSR is 278 days or 2,224 working hours. On this basis the direct labor required to yield the possible production of 38,750 SDT of naval construction is shown in Table 2.*

A probable program for the construction of cargo vessels in the shipyard (see Table 6) indicates that 73,400 GRT can be completed annually. Using a US factor of 175 man-hours required to

* Table 2 follows on p. 20.

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Table 2

Estimated Number of Direct Employees
Required to Construct Soviet Naval Vessels

Type of Vessel	Class	Tonnage (SDT)	Direct Employees
Submarine	Z	5,250	2,226
Submarine	W	3,120	1,327
Subchaser	Artillerist	4,500	1,685
Cruiser	Sverdlov	14,000	3,355
Destroyer	Skoryy	12,000	4,478
Total		38,750 to 38,870	13,071

produce 1 GRT of cargo construction, the annual program would require 5,800 direct employees working on a 1-shift basis and a 2,224-hour man-year. The total labor force for the yard would be 7,700 employees.

A shipbuilding technical school in Molotovsk offers 4-year courses to both sexes from 14 to 35 years of age. This school trains students to become technicians, mechanics, and technologists in shipbuilding, ship machinery, and metalworking. 42/

VIII. Sources of Power and Materials.

Oceangoing freighters call at the port of Molotovsk, but no estimate of actual tonnage handled by the port is available. Inadequate cargo transfer facilities and poorly supervised and inexperienced personnel frequently delay cargo unloading. The bulk of freight moved into the shipyard is by rail. 43/

Shipyard imports from the interior mainly must be shipped over the double-track Archangel-Vologda railroad line or by inland waterway over the Baltic-White Sea canal, which also connects with the Volga waterway system at Shcherbakov. This inland waterway system is open to navigation from May to October. 44/

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1. Power.

Electric power and probably some steam heat is supplied to the shipyard from the municipal power plant located at the eastern end of the shipyard, point 130 on Fig. 1. The capacity of this plant is reported to be about 50,000 kilowatts. The estimated consumption of the shipyard is 65.7 million kilowatt-hours per year with a coincident peak load of 15,000 kilowatts based on a 50-percent load factor. This plant supplies the shipyard, the city of Molotovsk, and part of the city of Archangel with electric power. This power plant is not connected with any major grid system. It is tied in with a small generating plant at Archangel. 45/

2. Materials.

No data are available indicating the amounts of raw, semi-finished, or finished materials received by the shipyard. Coke, steel plate, cement, and wood are received in large quantities by rail. Foundry pig iron, steel for forgings, steel plates, and shapes are probably obtained from the Urals and possibly from Moscow and Leningrad. Armor plate is obtained from the Izhora/Kuybyshev Plant at Kolpino and components from Leningrad, 46/ and probably other manufacturing centers in the USSR. Coal is probably received by rail or water from the Pechora Basin and by water from Novaya Zemlya.

IX. Capabilities, Vulnerabilities, and Intentions.

The facilities of the shipyard will probably be used to their fullest extent for building naval vessels with special emphasis on producing ships for the Northern Fleet. This shipyard has the capacity for building all types of naval vessels from the smallest patrol craft or submarine to battleships or carriers and merchant ships from barges to fairly large oceangoing passenger liners.

Facilities within the shipyard indicate that all new construction including vessels of destroyer size could be completed including the installation of all naval ordnance. Cruisers and other large vessels built in the large covered shipbuilding docks could be completed up to a height of about 112 feet above the base line. Past production has not required fitting-out facilities for vessels larger than destroyers. It would seem reasonable to assume, however, that should a program of large vessel building be undertaken, fitting-out cranes

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would be installed as required. An alternative to expanding the fitting-out facilities would be to move large vessels to the Rosta Naval Dockyard near Murmansk for completion, or possibly to the commercial quay in Molotovsk, where portal and floating cranes have been reported. 47/

A. Capabilities.

Based on a realistic appraisal of the support required by the Soviet Northern Fleet, Table 3 presents a theoretical program for the concurrent construction of naval vessels in Molotovsk Shipyard No. 402 that will utilize all known facilities.

Table 3

Theoretical Concurrent Construction Program
for Naval Vessels in Molotovsk Shipyard No. 402 a/

Location	Type	Class	Number of Vessels	Length (Feet)	Total Tonnage (SDT)
21	Submarines	Z	4	310	7,000
21	Submarines	W	3	250	3,600
21	Subchasers	Artillerist	8	175	2,400
35	Cruisers	Sverdlov	2	689	28,000
35	Destroyers	Skoryy	4	420	12,000
39	Subchasers	Artillerist	2	175	600
Total					53,600

a. The use of all known facilities to their maximum capability would permit the concurrent construction of 10 destroyers totaling 30,000 tons, 2 subchasers totaling 600 tons, and 2 battleships totaling 90,000 tons or a grand total of 120,600 SDT. Annual production on this basis would be about 45,000 tons. A more realistic program is presented in Table 4 and, therefore, all capability estimates used in this report are based on Table 4.

There is little evidence of new construction being laid down on the transverse ways, points 21 and 39 on Fig. 1, since 1946. It is believed, however, that these building ways would be made serviceable should the program demand.

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B. Annual Naval Vessel Production Estimate.

Based on the construction listed in Table 3, the possible annual production in naval SDT is estimated in Table 4.

Table 4

Estimated Naval Vessel Annual Production Capacity of Molotovsk Shipyard No. 402

Number of Vessels	Type	Class	Total Tonnage (SDT)
3.0	Submarines	Z	5,250
2.6	Submarines	W	3,120
15.0	Subchasers	Artillerist	4,500
1.0	Cruiser	Sverdlov	14,000
4.0	Destroyers	Skoryy	12,000
Total			38,750 to 38,870

In computing the annual production, the following estimates and assumptions were made:

1. The necessary material, labor, and power would be available.

2. Only one 8-hour labor shift would be employed.

3. Vessels would remain on the ways until essentially completed. The time required to complete the cruisers above the 112-foot line has been disregarded in this estimate because the construction rate will not be affected.

4. Way time is considered to be the principal limiting factor of the production rate. Estimates have been made based on estimated and reported rates elsewhere in the USSR and modified according to geographic location of the shipyard, weather conditions which would affect construction on the open ways, and the possible advantage

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gained by building inside the heated, covered building docks. Way time estimates are as follows: Z-class submarine, 16 months; W-class submarine, 14 months; Artillerist subchaser, 8 months; Sverdlov cruiser, 24 months; and Skoryy-class destroyer, 12 months. It is assumed that 1 cruiser and 2 destroyers could simultaneously be built in each dock.

C. Merchant Vessel Production.

In the event that the shipyard should be devoted to the production of merchant vessels, a probable program for the concurrent construction of self-propelled cargo ships is shown in Table 5. The program would fully occupy all known facilities.

Table 5

Probable Concurrent Construction Program
for Self-Propelled Cargo Vessels in Molotovsk Shipyard No. 402

Location	Type	Number of Vessels	Length and Breadth (Feet)	Total Tonnage (GRT)
21	Cargo	6	425 x 57	30,000
39	Logger	1	130 x 24	350
35 a/	Cargo	8	425 x 57	40,000
Total				70,350

a. Four vessels can be constructed simultaneously in each of the two building docks.

Based on the construction listed in Table 5, the possible annual production of merchant vessels in gross register tonnage is estimated in Table 6.*

* Table 6 follows on p. 25.

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Table 6

Estimated Merchant Vessel Annual Production Capacity of Molotovsk Shipyard No. 402

Number of Vessels	Type	Total Tonnage (GRT)
14.3	Cargo	71,328
6.0	Loggers	2,100
Total		73,428

The estimates and assumptions made in calculating merchant tonnage were similar to those made for the calculation of naval tonnage.

1. The necessary material, labor, and power would be available.

2. Only one 8-hour labor shift would be employed.

3. The vessels would be essentially complete before launching.

4. Way time for the 425-foot cargo vessels was estimated at 13 months for those building on the transverse open ways and at 11 months for those building in the covered building docks. It was estimated that 6 loggers could be produced per year on the transverse open ways, point 39.

Output in both naval and merchant tonnage possibly may be increased by increasing the number of hours of the one shift, the repetitious production of a single design, improving technological processes, and adequate apprentice training. Assuming no bottleneck in the supply of material, output may be increased by working additional shifts. It is considered doubtful, however, that sufficient qualified supervision and skilled workmen could be made available to justify a material increase in the output estimate for the additional shifts.

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Production of vessels at the foregoing estimated rates would seriously limit the yard's capability for vessel repairs. All docking facilities would be engaged by new construction and possibly all quays in fitting out the newly built vessels.

The supporting shops in the shipyard are believed to be adequate to produce the estimated tonnage assuming that all hull steel would be fabricated and assembled within the shipyard from rolled plates and shapes; all light and heavy castings and forgings, including propellers and propeller shafts, would be cast and machined within the shipyard; all machinery assembled and installed; boilers manufactured and installed; and probably all naval ordnance installed.

D. Vulnerabilities and Intentions.

Molotovsk Shipyard No. 402 appears to be very well developed and well coordinated, but is vulnerable with respect to its physical location. Although located in the western part of the USSR it is still 700 to 1,000 miles from the main industrial centers. The lack of highway transportation lays the burden of supplying the shipyard largely on the double-track Archangel-Vologda railroad line. The Baltic-White Sea canal is of secondary importance and is open to navigation only 6 months of the year.

Few industries are located in the general area of Molotovsk from which industrial labor could be drawn in case of rapid expansion.

The source of electric power and heat is the single large plant located immediately east of the shipyard. This plant is not tied in with any major power grid upon which it could call in case of power failure.

In general, the shipbuilding industry may be classified as a "value added" type of industry. Because of this type of operation, the chief economic hazard of the Molotovsk shipyard is the question of an assured flow of raw materials and components produced by other industries.

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APPENDIX A

METHODOLOGY

The main body of the report was compiled chiefly from postwar intelligence and 1943 and 1944 aerial photography. Little value was given past production other than to gain knowledge of the range of types of vessels built.

The designation of building and shop use and the description of facilities are digests of the postwar reports contained in the consolidated plant folder in the Industrial Register.

The charts of the shipyard were made from enlarged 1944 aerial photographs which were modified to agree with reported developments.

Explanations of the methodology used to estimate the shipyard's current capability to produce naval and merchant vessels and the rate of production are contained in the text.

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APPENDIX B

GAPS IN INTELLIGENCE

The major gap in intelligence seems to exist in the area of Soviet intentions; that is, whether this shipyard will be completed as a shipbuilding yard only with all major repairs to large vessels done at Rosta or whether further development will take place to expand the repair facilities. Additional information on shipyard development would be valuable in estimating the future role of this yard.

Past production figures mean very little, because they have to be evaluated in the light of the state of completion of the shipyard at the time of production.

The major over-all gaps are those that pertain to current and planned production; sources and quantity of raw, semifinished, and finished material; destination of products; availability and efficiency of manpower; technological processes; and capital investment and budgets.

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APPENDIX C

SOURCES AND EVALUATION OF SOURCES

1. Evaluation of Sources.

The compilation of data and the preparation of estimates and conclusions were derived from research in the files of the Industrial Register, CIA Library, Graphics Register, and from discussions held with other IAC members.

The documents reviewed in the Industrial Register were mainly raw intelligence consisting chiefly of prisoner-of-war reports. A few of these sources were skilled mechanics. The reliability of single reports could be evaluated only on their contribution to the study as a whole. The composite of selected reports may be given a rating of possibly true.

25X1C

25X1C The documents reviewed in the CIA Library were additional prisoner-of-war reports, publications of IAC agencies, [redacted]
The prisoner-of-war reports should be rated the same as those reviewed in the Industrial Register, possibly true. The remainder of the documents reviewed in the CIA Library have been given a high evaluation because they represent the considered opinion of experienced observers and analysts.

The CIA Graphics Register gave valuable aid in obtaining aerial and land photos from which the location of the shipyard and installations could be determined.

2. Sources.

Evaluations, following the classification entry and designated "Eval.," have the following significance:

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Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which will carry the field evaluation "Documentary" instead of a numerical grade.

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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